A Comparative Survey of Tree Damage at Cabrits National Park and Emerald Pool

By Melissa Bennett
June 6, 2001

Texas A&M Dominica Study Abroad Class
Dr. Tom Lacher
Dr. Robert Wharton

Abstract

Tree damage, Dbh, basal area were measured and the tree species were noted at Cabrits National Park and Emerald Pool in Morne Trois National Park. Both sites had low damage levels, but the damage at Cabrits was almost twice the amount at Emerald Pool. On average, the Dbh of the trees in Emerald Pool was twice as large as Cabrits, and trees in sample plots at Cabrits had one-third the basal area of Emerald Pool. Tree species varied with location. *Bursera simarouba* (Naked Indian) was the most heavily damaged and the most frequently damaged species of trees in Cabrits, but in Emerald Pool the most damaged tree species was *Dacryodes excelsa*.

Introduction

Many visitors enjoy Dominica's national parks every year. Although visitors bring in needed revenue, they often cause damage as well. Two of the most frequently used parks are Cabrits and Emerald Pool, but they vary greatly in composition. Cabrits is a dry scrub woodland forest located on the northwest side of the island. Emerald Pool is composed of rain forest and is located on the central part of the island. This study was designed to determine if tree damage varied in the two different types of forests, and whether tree damage was related to the distance that trees were located from the trail. Colmore S. Christian originally conducted a larger study of damage throughout Cabrits and Emerald Pool for his P.h.d dissertation (Clemson) in 1996. The following study is an adaptation of Christian's study on a smaller scale.

Materials and Methods

15m measurement tape
Flagging Tape
DBH (cm) measurement tape
Compass

Four square 5x5 meter plots were constructed in Cabrits National Park and Emerald Pool. Each intial plot was selected at a random spot along the park trail and a 5x5 m plot was marked off using a compass to obtain straight lines. Trees that had a dbh of 5 cm or greater were included in the study. The same person measured all the Dbh readings for consistency. The second plot was constructed 50m away (along the trail path) from the intial plot. The third and fouth plots were constructed 10m directly behind Plots 1 and Plots 2 away from the trail. Damage to the trees was rated using an adaption to the Marions System (1=none, 5=fallen tree). Dead trees were noted, but were not included in the calculations. The trees were identified whenever possible. However, many trees in Cabrits had lost their leaves, and many of the trees in Emerald Pool were too tall to view the leaves so they could not be identified.

Results

Data for Cabrits Plots 1-4

Plot 1- Cabrits National Park; Located Along the Trail			
Tree Number	**Damage Number**	**DBH (cm)**	**Tree Type**
1	**4**	**33.8**	***Bursera simarouba***
2	**4**	**27.4**	***Bursera simarouba***
3	**1**	**5.7**	**Unknown-no leaves**
4	**1**	**21.7**	**Unknown-no leaves**
5	**1**	**9.9**	***Bursera simarouba***
6	**1**	**12.5**	**Unknown-no leaves**
7	**1**	**62.4**	**Unknown-no leaves**
8	**1**	**43.3**	***Calophyllum calcuba***
9	**5**		**Felled**

Calculations of Plot 1

TDI (Tree Damage Index) = 2.11
Mean DBH = 24.1 cm
Min DBH = 5.7 cm
Max DBH = 62.4 cm
Basal Area = 455.40 cm^2

Plot 2- Cabrits National Park; Located 50m North of Plot 1; Located Along the Trail			
Tree Number	**Damage Number**	**DBH (cm)**	**Tree Type**
1	**1**	**11.5**	**Unknown- no leaves**
2	**1**	**23.6**	***Calophyllum calcuba***
3	**1**	**9.6**	***Calophyllum calcuba***
4			**Dead**

Calculations for Plot 2

TDI = 1.00
Mean DBH = 14.9 cm
Min DBH = 9.6 cm
Max = 23.6 cm
Basal Area = 174.37 cm^2

Plot 3- Cabrits National Park; Located 10m East of Plot 1			
Tree Number	**Damage Number**	**DBH (cm)**	**Tree Type**
1	**1**	**8.9**	***Calophyllum calcuba***
2	**1**	**8.9**	**Unknown-no leaves**
3			**Dead**
4	**1**	**21.3**	**Unknown-no leaves**

Calculations for Plot 3

TDI = 1.00
Mean DBH = 13.03 cm
Min DBH = 8.9 cm
Max DBH =21.3 cm
Basal Area = 133.35cm^2

Plot 4- Cabrits National Park; Located 10m East of Plot 2			
Tree Number	**Damage Number**	**DBH**	**Tree Type**
1	**1**	**9.2**	***Calophyllum calcuba***
2	**1**	**13.4**	***Haematoxylum***
3	**1**	**11.1**	**Unkown- no leaves**
4	**5**		**Felled**
5	**1**	**17.5**	**Unknown- no leaves**
6	**1**	**17.5**	**Unknown- no leaves**

Calculations for Plot 4

TDI = 1.67
Mean DBH = 11.45 cm
Min DBH = 8.9 cm
Max DBH = 21.3 cm
Basal Area = 102.97 cm

Overall Statistics for Cabrits National Park

TDI = 2.05
Mean DBH = 15.87 cm
Min DBH = 5.7 cm
Max DBH = 62.4 cm
Mean Basal Area = 197.81 cm^2

Data for Emerald Pool Plots 1-4

Plot 1- Emerald Pool; Located Along the Trail			
Tree Number	**Damage Number**	**DBH (cm)**	**Tree Type**
1	**1**	**34.8**	***Amanoa caribea***
2	**1**	**33.9**	***Symphonia globulifera***
3	**1**	**29.0**	***Amanoa caribea***
4	**1**	**8.5**	**Unknown**
5	**4**	**85.5**	***Dacryodes excelsa***

Calculations for Plot 1

TDI = 1.60
Mean DBH = 38.34 cm
Min DBH = 8.5 cm
Max DBH = 85.5 cm
Basal Area = 1154.50 cm^2

Plot 2- Emerald Pool; Located 50 m South of Plot 1 Along the Trail			
Tree Number	**Damage Number**	**DBH (cm)**	**Tree Type**
1	**1**	**9.0**	***Cyanthea arborea***
2	**1**	**28.0**	***Licania ternatensis***
3	**1**	**17.3**	**Unkown**
4	**3**	**61.5**	***Sloanea caribea***
5	**1**	**63.0**	***Sloanea caribea***

Calculations for Plot 2

TDI =1.40
Mean DBH = 35.7 cm
Min DBH = 9.0 cm
Max DBH = 61.5 cm
Basal Area = 1000.98 cm^2

Plot 3-Emerald Pool;Located 10m West of Plot 1			
Tree Number	**Damage Number**	**DBH (cm)**	**Tree Type**
1			**Dead**
2	**2**	**15.5**	***Richeria grandis***
3	**1**	**6.5**	***Coccoloba ascendens***
4	**1**	**5.0**	***Coccoloba ascendens***
5			**Dead**

Calculations for Plot 3
TDI= 1.40
Mean DBH = 35.70 cm
Min DBH = 5.0 cm
Max DBH = 15.5 cm
Basal Area = 63.62 cm^2

Plot 4- Emerald Pool; Located 10m West of Plot 2			
Tree Number	**Damage Number**	**DBH (cm)**	**Tree Type**
1	**1**	**99.5**	***Amanoa caribea***
2	**1**	**5**	***Simarouba amara***
3	**1**	**43.0**	**Unknown**
4	**1**	**7.2**	**Unknown**
5	**1**	**6.5**	***Cyanthea arborea***

Calculations for Plot 4
TDI = 1.00
Mean DBH = 32.20 cm
Min DBH = 5.0 cm
Max DBH = 99.5 cm
Basal Area = 814.33 cm^2

Overall Statistics for Emerald Pool

TDI = 1.33
Mean DBH = 28.81 cm
Min DBH = 5.0 cm
Max DBH = 99.5 cm
Mean Basal Area = 651.89cm^2

Discussion

Tree measurements and species composition differed in Cabrits and Emerald Pool. Species composition varied with each location because of the varied habitats. The dry scrub woodland forest of Cabrits receives much less rain than the rain forest of Emerald Pool. The difference in precipitation help to determine which trees can survive in an area. *Bursera simarouba* and *Calophyllum calcuba* were the most frequent species in the plots at Cabrits, but there were many trees in Cabrits that could not be identified because they lost their leaves during the dry season. The most frequent species at Emerald Pool were *Sloania caribea, Cycanthea arborea,* and *Amanoa caribea*. Some species of trees in Emerald Pool could not be identified because the leaves were located too high to be clearly seen with binoculars. However, Cabrits had twice number of dead trees (4) as Emerald Pool (2). It would be hard to determine the overall diversity of each location because of the number of unidentified trees. On average, the trees at Trees at Emerald Pool had double the Dbh measurements of Cabrits. This is probably due to the amount of rainfall and length of the growing season or the size limits of a particular species of tree. Emerald Pool had over three times the basal area of those at Cabrits. This result occurs because most of the trees in Emerald Pool have large Dbh measurements, thus allowing them to have more canopy cover.

The type and extent of tree damage varied with each location. Neither location showed signs of extensive damage, but Cabrits had almost twice the damage as Emerald Pool. The tree species that was most heavily damaged was *Bursera simarouba* (Naked Indian). Most of the *B. simarouba* that were examined were covered with extensive carvings. Emerald Pool had a very low damage rating (1=lowest), but the most of the damage was caused by people stripping the bark or removing branches. More damage was done to the plots located beside the trail in both Cabrits and Emerald Pool, but there is not a major difference. These findings indicate that overall visitors do not cause extensive damage to the trees in the either park, but often cause extensive damage to particular trees.

The results from Colmore Christen's study completed in 1996 indicated that Emerald Pool had an average basal area of 408.30 cm^2, and average Dbh of 17.79 cm. Cabrits had an average basal area 145.39 cm^2, and an average Dbh of 12.27 cm. Although the results in this study do not match Christen's results, the general trends are the same.

This study could easily be repeated because it does not require special tools. More accurate results could be obtained with larger plot sizes and increasing the number of plots.

Acknowledgements

I would like to thank Dr. Lacher for helping me to measure out my plots, trees and for his patient instruction. I owe Holli Swick and Alex Vilaythong many thanks for assisting me in Cabrits National Park, and I would also like to thank Susan for helping me to measure trees and plots at Emerald Pool.